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## Antibacterial effects of some root end filling materials

**Torabinejad M, Hong CU, Pitt Ford TR, Kettering JD. Antibacterial effects of some root end filling materials. J Endodon 1995;21:403-6.**

**PURPOSE:** To investigate and compare the antibacterial effects of amalgam, zinc oxide-eugenol (ZOE) cement, Super EBA cement, and MTA on some selected oral bacteria.

**M&M:** Nine facultative and seven anaerobic bacteria commonly found in infected root canals were used in this study. Teflon rings were made, and the following test materials were placed within them: Dispersalloy, Sybraloy, Super EBA, ZOE, and MTA. Freshly mixed and 24-set materials were tested. Overnight cultures of the selected bacteria were inoculated into appropriate growth media, diluted on the day of use, and 0.1 ml of each bacterial culture was placed onto solid media. Freshly mixed and 24-set test materials were placed on the surfaces of the solid media and incubated. Antibacterial effects were determined by measuring the diameters of the zones of inhibition in mm.

**RESULTS:** Dispersalloy and Sybraloy had no antibacterial effects against any of the tested organisms, either facultative or anaerobic. Super EBA, ZOE, and MTA all had some antibacterial effects against some of the facultative bacteria, but not all. Super EBA and ZOE had some antibacterial effects against 2 of the 7 anaerobic bacteria (*Fusobacterium necrophorum* and *F. nucleatum*), while MTA had no effect on any of the anaerobic bacteria.

**C&C:** A "nice-to-have" property of root-end filling materials would be some antibacterial effects, but based on the results of this study, none of the most widely-used materials showed this effect against all of the tested bacteria. Super EBA, ZOE, and MTA all had some antibacterial effect, attributable to the free eugenol in Super EBA and ZOE and the high pH of MTA. It may not be possible to have a material that has antibacterial properties against all microorganisms without it also being irritating or cytotoxic to normal cells.

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**Michael Hall**

## Mutagenicity of AH26 in an in vitro mammalian cell mutation assay

**Schweikl H, Schmalz G, Stimmelmayer H, Bey B. Mutagenicity of AH26 in an in vitro mammalian cell mutation assay. J Endodon 1995;21:407-10.**

**PURPOSE:** To test the mutagenic activity of the root canal sealer AH26, using a mammalian cell mutation assay.

**M&M:** AH26 was eluted in dimethyl sulfoxide or physiological saline immediately after mixing, and following setting times of 24h or 7d, at 37°C. Various dilutions of the original eluates, in addition to unmixed AH26 powder and liquid, were separately tested for cytotoxicity and mutagenicity, in triplicate. Chinese hamster cell cultures were exposed to the AH26, or its components, for 24h. Following trypsinization, the cell number was determined. Subcultures were replated on selective media designed to isolate mutants. Colonies were stained and counted.

**RESULTS:** The cytotoxicity of eluates of the mixed material was dose-related, and decreased with increasing setting time. Unset AH26 killed ~ 90% of the cells at a dose of 0.5 mg, whereas the toxicity of the 24h set material was reduced ~ 10-fold. AH26 that had set for 7d was weakly toxic compared with the freshly mixed material. The mutation frequency of AH26 also depended on the setting time of the mixed material. The number of mutants after exposure to eluates of unset AH26 was enhanced ~ 7- to 10-fold. No mutants were observed at higher doses because of the high toxicity. Mutagenicity was clearly reduced after a setting time of 7d.

**C&C:** Cytotoxicity and mutagenicity of AH26 appear to be dose-related and a function of setting time. The active substance of AH26 is probably the liquid component and not a product of the curing reaction. This epoxy-*bis*-phenol resin behaved similarly to mixed and set AH26. Further studies are necessary to complete the "mutagenicity profile" of most dental materials, as newly-developed test systems have not been used widely. Mutagenic effects in patients after endodontic treatment with AH26 are not likely to occur; however, dental professionals and people manufacturing the material may be exposed to the chemicals over long periods of time.

**August 1995  
Bates**

**Christopher F.**

## Properties of hand-held spreaders after simulated use

***Svec TA, Powers JM. Properties of hand-held spreaders after simulated use. J Endodon 1995;21:411-4.***

**PURPOSE:** To evaluate a commonly used spreader under controlled, simulated clinical conditions.

**M&M:** Forty D11T spreaders made by Endeco (EN), Hu-Friedy (HF), and Premier (PR) were tested. Diameters at D3 and D16 were measured and the instrument taper was calculated. They were divided into 4 groups: Group A were controls; Group B spreaders were autoclaved for 10 cycles; Group C were placed 50 times at a rate of 200 mm/min into plastic blocks with 30° curved canals; Group D were sterilized for 10 cycles and then inserted in blocks as in Group C. Each group had 10 spreaders from each source for a total of 30/group. The instruments were subjected to the bend test described in ANSI/ADA Proposed Specification no. 71, in which the instruments were subjected to deflections of 15, 20, and 40 mm. They were examined for any permanent angular deflection (PAD). An Instron testing machine was used to insert the spreaders of Groups C and D into the blocks.

**RESULTS:** All of the instruments tested under the defined conditions passed the bend test as outlined in the proposed spec. The Endeco spreaders had a PAD which was sig higher than those of HF and PR. Proposed tolerances for diameters of spreaders is 0.05 mm; all EN spreaders met these limits, but HF and PR spreaders varied more than the 0.05 mm tolerance level.

**C&C:** The bend test does not accurately simulate clinical conditions, but it did show that spreaders get permanently deformed, which may cause gutta-percha to get dislodged by the bent tip as the spreader is withdrawn during obturation. The taper of the instruments according to manufacturer were inconsistent, but the significance of this is not known.

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**Michael Hall**

## Comparative evaluation of the antibacterial effects of intracanal Nd:YAG laser irradiation: An in vitro study

**Fegan SE, Steiman HR. Comparative evaluation of the antibacterial effects of intracanal Nd:YAG laser irradiation: An in vitro study. J Endodon 1995;21:415-7.**

**PURPOSE:** To compare different methods of disinfecting bacterial-contaminated root canals.

**M&M:** 80 single-rooted teeth were instrumented to a #35 file 1 mm short of the apex, and prepared with standard step-back and coronal flaring techniques. A solution of *Bacillus stearothermophilus* spores was prepared from Chem Spore indicators, and 10 µl was pipetted into each tooth. The remainder of the chamber was filled with the corresponding irrigant. Group 1 - sterility control, not inoculated; group 2 - positive control, inoculated, no other treatment; group 3 - inoculated, filled with sterile water, and instrumented for 1 min with a #35 file; group 4 - inoculated, filled with 5.25% NaOCl, and instrumented for 1 min with a #35 file; group 5 - inoculated, filled with sterile water, ultrasonically instrumented for 1 min; group 6 - inoculated, filled with 5.25% NaOCl, ultrasonically instrumented for 1 min; group 7 - inoculated, filled with sterile water, and irradiated with the Nd:YAG laser at 3W and 20 pps; and group 8 - inoculated, filled with 5.25% NaOCl, irradiated with the Nd:YAG. Canal flushings after instrumentation were cultured, and colonies were counted using a digital counter.

**RESULTS:** No significant differences were found between hand instrumentation with water and ultrasonic instrumentation with water. The laser group with water reduced bacterial growth significantly compared with the hand instrumentation groups with water. All groups that used 5.25% NaOCl showed no growth. Hand and ultrasonic instrumentation groups with water significantly reduced colony growth from control groups, but were not as effective as laser groups.

**C&C:** The Nd:YAG laser with water was the only instrument that effectively inhibited the growth of *B. stearothermophilus* alone. Thus, Nd:YAG shows potential for disinfecting root canal systems. Possible drawbacks to the Nd:YAG laser may be limits to the size of the fiberoptic delivery device, flexibility of the quartz fiber in curved canals, and directional control of the beam.

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Bates**

**Christopher F.**

## Properties of endodontic hand instruments used in rotary motion

***Tepel J, Schäfer E, Hoppe W. Properties of endodontic hand instruments used in rotary motion. Part 1. Cutting efficiency. J Endodon 1995;21:418-21.***

**PURPOSE:** To investigate the cutting efficiency of Nitinol K-files, stainless steel (SS) reamers, K-files, and flexible instruments by the use of a standardized method analogous to their clinical use.

**M&M:** A computer-driven testing device was used to evaluate the cutting efficiency of the listed instruments in resin specimens with simulated canals. The testing device was analogous to manual instrumentation using linear and rotary motions. Maximum penetration depth (MPD) of the root canal instrument into the canal could be controlled, and the actual depth of penetration was recorded continuously. The balanced force and stepback techniques were evaluated (I think). MPD of the resin specimens was the criterion for evaluating cutting efficiency and the basis for comparing the instruments. The instruments tested were: Nitinol K-files made by 3 manufacturers; SS reamers and K-files made by 7 manufacturers; flexible SS instruments, four with conventional tips and 3 with noncutting tips, made by 3 and 2 manufacturers, respectively. #25 and #35 instruments were tested, with a sample size of 12 for each type and size instrument.

**RESULTS:** Most SS instruments reached greater MPD than Nitinol K-files. SS K-files showed greater MPD than reamers of the same brand, with one exception. Flexible instruments, except Flexicut #35, reached greater MPD than all other instruments. In descending order of cutting efficiency, the #25 flexible files ranked this way: Flexoreamer, Flexoreamer Batt tip, K-Flexofile, K-Flexofile Batt tip, K-Flex, Flex-R file, and Flexicut.

**C&C:** Nearly all K-files in this study showed better cutting efficiency than reamers of the same brand. Compared with SS instruments, Nitinol instruments have no cutting efficiency advantages (but they also probably do not separate or transport, ledge, zip, or perf like SS instruments).

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**Michael Hall**

## **Preventing root tip loss in the maxillary sinus during endodontic surgery**

***Jerome CE, Hill AV. Preventing root tip loss in the maxillary sinus during endodontic surgery. J Endodon 1995;21:422-4.***

**PURPOSE:** to present a simple technique for preventing accidental root tip intrusion into the maxillary sinus.

**TECHNIQUE:** Review presurgical radiographs for roots appearing superior to the sinus floor and sinuses pneumatized proximal to the roots. Radiographic osseous erosion into the sinus is a special consideration. Upon surgical access, one must assess whether sinus exposure exists or is likely. One feasible method of preventing debris from entering the sinus is to secure the root tip with a suture before apicoectomy and removing the inflammatory lesion attached to the root tip. Create a hole at the very apex with a #2 round bur or ultrasonic retrotip. Hole preparation can be done from both mesial and distal directions if access is restricted. A 3/8 circle cutting (CC 76) needle with Lukens 6-0 black braided silk is recommended, and may be threaded with a mosquito hemostat. The apicoectomy section is made just coronal to the prepared hole, and the root tip may be delivered without concern of losing it in the sinus.

**DISCUSSION:** Exposure of the maxillary sinus during endodontic surgery is a reality. If a sinus exposure exists, grinding the root to the desired level may create more debris than a single sectional cut. Also, control of rotary instruments is easier when only a single cut is required.

**C&C:** The proposed procedure appears simple, practical, and possible to perform with minimal armamentarium at hand. The alternative, a plan of action for treatment or referral of a root tip lost in the maxillary sinus, is not nearly as attractive.

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Bates**

**Christopher F.**

## Retreatment using a modified-tip instrument

***Fachin EVF, Wenckus CS, Aun CE. Retreatment using a modified-tip instrument. J Endodon 1995;21:425-8.***

**PURPOSE:** To present a technique for removing hard pastes from the root canal.

**DISCUSSION:** Removal of hard pastes from root canals is technically difficult since they cannot be bypassed and are not soluble. Ultrasonics is useful but can be time-consuming. This study reports the use of a modified-tip file which has proven to be effective and fast when removing hard pastes from the canal. An ortho pliers is used to remove 4 mm of the tip of K-type files #30 and #35, leaving a sharp edge at the tip. With apical pressure and a reaming motion, the file can then be used to remove hard pastes and also to negotiate calcified canals. Four case reports of retreatments using the modified file are presented.

**C&C:** The authors rightly point out that it is necessary to take extra radiographs to ensure the files remain in the original canal, and that this technique is **not** useful in curved canals. Use of smaller files, #15 and #20, with modified tips, might be useful if used carefully in those cases.

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